A Suborbital Spaceship for Short Duration Space and Microsat Launch

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ABSTRACT: The TGV Rockets corporation is working on a small Vertical Takeoff Vertical Landing Suborbital Rocketship capable of carrying 1000 kg to 100 km for low cost. This provides unique and interesting capabilities for payload test and qualification, development and short duration experimentation. Theoretical possibilities include micro-sat launch.

TGV Rockets was founded in 1997 on a desire to commercialize the Delta Clipper-Experimental (DC-X)[1,5,8]. Subsequently TGV has been working towards this goal and has worked towards a design that will provide a commercially viable suborbital platform for Science and Technology work.

CAPABILITIES

TGV has created several basic capabilities that will change the nature of spacecraft design testing and operations.

Transportability: The TGV Vehicle is designed for road/rail and air transport at minimal cost. This will allow field operations in areas of interest.

Operability: The TGV Vehicle is designed for a rapid operations cycle with several flights per day possible[2,3,7,10].

Simple payload integration: A rapid and simple method of installing and removing payloads without clean room support, precision equipment and in field conditions.

SYSTEMS CONCEPT

Figure 1. Conceptual Vehicle Illustrating Simplified Transportation and Logistics Support

The concept is a modular scalable suborbital vehicle capable of road, air or rail transport into most areas of the planet. The vehicle uses multiple redundant pressure fed propulsion modules providing high reliability.

PROGRAM STATUS

Currently the program has completed preliminary design. Principal subcontractors are under contract and risk reduction work is in progress.

PAYLOAD CAPABILITIES

TGV will provide 1000 kg to 100 km altitude for the duration of ballistic flight.

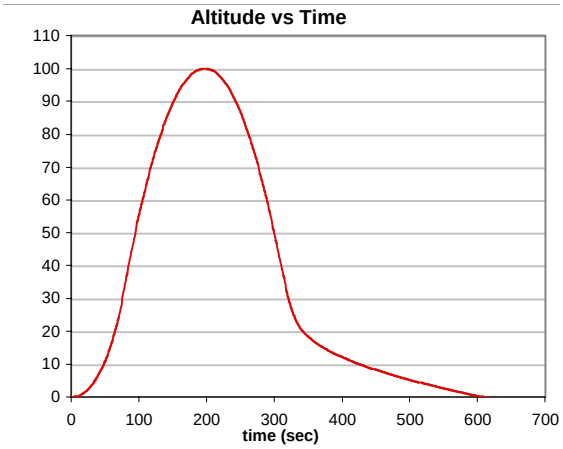

Figure 2. Suborbital Trajectory

Payload mounts are strictly notional at this time but representative volumes are described for the suborbital flight.

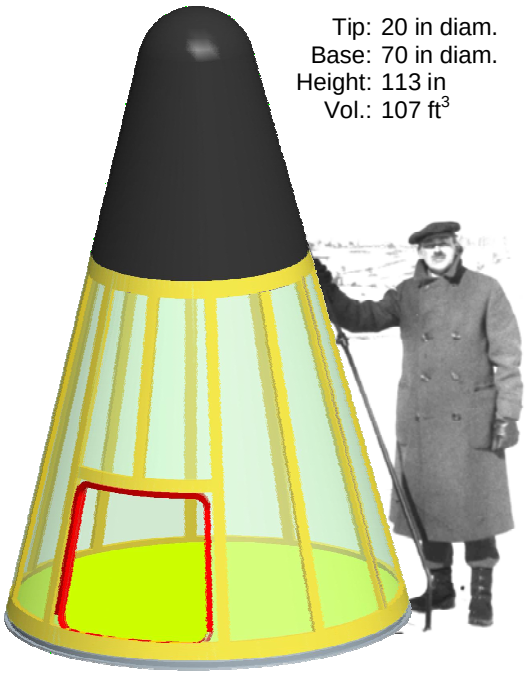

Figure 3. Representative Payload Volume for Suborbital Flights

APPLICATIONS

Short Duration Test

Rapid access to near space provides a unique capability for integrated system test of payloads, spacecraft or subsystems in combined vacuum, micro-gravity and thermal environments.

MicroSat Launch

While very little design effort has been performed, from a strict physics point of view a potential 250 kg payload can be launched to low earth orbit. This has some potential interest to the small sat community. The accommodation of an upper stage would replace the payload volume in Figure 3. TGV looks forward to working with the MicroSat community to define appropriate interfaces and accommodations.

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